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Service Oriented Investments

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Abstract: In this ever faster changing world organisations have to be very flexible in organising their resources and processes. This paper proposes a capability approach to solve the problems related to constantly changing environment. A link is also laid between the capability approach and Service-Oriented Architecture, which supports adequately the capability approach.
The assessment of the investments is based on real options method because of the great uncertainty caused by this environment. However, the use of the Real Options is not obvious for a profit organisation. In particular the assessment of returns is difficult. For a non-profit organisation, it is hardly to accomplish. Therefore this paper introduces the notion of Service Options to suite better the assessment of investments in "Capabilities delivering Services".

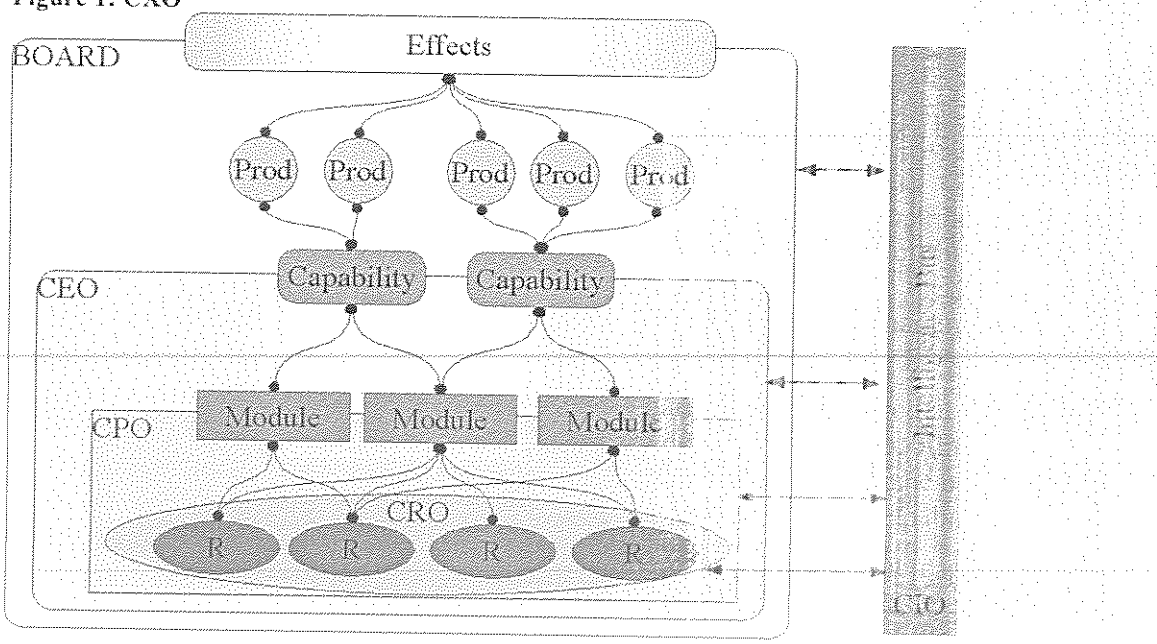
1. Introduction

The Board of an enterprise would like the enterprise to have some effects on the society (outcomes) by using its capabilities, which will then perform actions (output) to obtain these effects. The wanted effects will be described in a number of scenarios. Therefore the CEO will configure capabilities ([1]) to perform actions for all scenarios. In the ever faster changing world, these capabilities have to be flexible and easy to reconfigure.

However due to budgetary and operational reasons, not all scenarios can be covered at the same moment. The Board has to express which will be the maximum deployment of capabilities at the same time. CEO can propose different configurations, each with the costs. Or the board can decide a maximum budget, for which the CEO can optimise the configuration of capabilities.

Modules deliver the necessary capabilities, where one module can serve multiple capabilities. These modules are composed of resources. In the process area of capabilities generation, modules and/or resources are acquired following investment and recruiting plans (acquisition function). So we have a schema of outcomes – outputs – capabilities – modules – resources.

Figure 1: CXO



[1] In this context: Capability is the product of capacity and competence

Figure 1: CXO shows the different domains in an enterprise. The Board defines the general strategy of the enterprise and determines the desired effects in the environment. The sum of the effects should be the vision the enterprise. The CEO uses the capabilities to deliver the products to the market. The capabilities consist of modules, which are business processes, of course the business unit directors manage this processes but the Chief Process Officer (CPO) manages the descriptions of all these processes. The Chief Resources Officer (CRO) [2] manages all resources. Each specific domain of resources is managed by a resource manager, such as Human Resource Manager (HRM), Information and Communication Technology (ICT-) manager.

On all levels information is needed to function. It is the responsibility of the Chief Intelligence Officer (CIO) to manage the flow of information in the enterprise and to facilitate the production of intelligence to aid the decision processes [Rabaey 2005a].

The capability approach permits the introduction of the service concept within the enterprise. The goal of the paper is to describe a theoretical framework to guide the investments in services with the Service Options Method.

The next point is the description of the Interdisciplinary Forum, where the investments are assessed. Then Services and Capabilities are discussed, which will lead to the Service-and-Effect map. This map will be the basis for the optimisation of services. However a dynamic model of the enterprise is needed to determine the optimal configuration of the enterprise. Once defined, one can assess the service investments with the Service Options Method.

2. Interdisciplinary Forum

A (core) business process receives its objectives from the business strategy and it organises resources to attain these objectives (it consumes the different resources accordingly the respective resource strategies). If a lack of resources is detected or a change of resources is needed, then the business process owner would like to acquire the necessary resources. Since a change in the organisation of resources may affect the use of one or more resources, the impact has to be examined.

In a 'military' operation order the "core business" units receive their missions, the units of support have to deliver services to the core business. A support plan is defined and co-ordinated with the core business [Bernard 1976].

Therefore we suggest an Interdisciplinary Forum of business process owner and resource managers and possible CRO and partners [Rabaey 2004a, 2004b]. The discussion framework we propose is a self-assessment technique like Malcolm Balridge, European Foundation of Quality Management (EFQM) or Common Assessment Framework (CAF). These frameworks take into account topics as strategy, process management, leadership, partners and personnel. In the results, indicators are defined to check the critical issues. To avoid the suboptimal deployment of ALL resources in the WHOLE organisation, a global interdisciplinary forum session has to be held at corporate level [Rabaey 2005b].

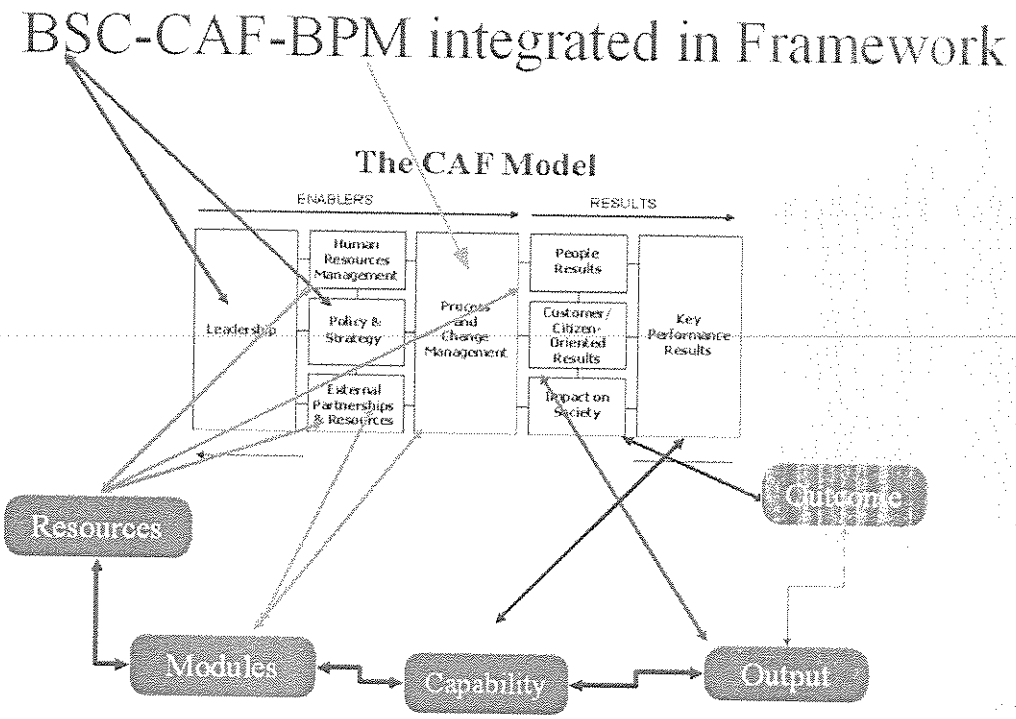
A new type of Balanced Scorecard (BSC) has also been proposed to have a better complementarity with the CAF [Rabaey 2005d]. The same type of BSC as for the business units may be used to guide the strategic leadership of the organisation.

2Some would say CTO (Chief Technical Officer), but it's more a coordinator of all resources

The business unit wishes to have effects (outcome) in the society (CAF criterion 8) by giving a good service or product (output) to the citizens and organisations (Crit 7). Therefore it needs capabilities (measured by Crit 9), which are generated by modules (processes, Crit 5), using resources (Crit. 3, 6, 4). The mission statement, vision and values are defined by the managers of the operational strategy (Crit. 1, 2).

So we have following structure of BSC five perspectives: outcome – output – capabilities – modules - resources. Regarding investments and evaluation of the business unit, this type of BSC is an extension of the CAF and with the interdisciplinary forum as global framework.

Figure 2: Integration of management techniques



This model can be applied to any type of organisation, even to the resources and service providers.

3. Service and capabilities

Each capability produces one or more outputs to its (internal and/or external) clients. The client expects a level of quality and service related to this output. In a business process to business process context the output (quantity and quality), time frame and services are described in a Service Level agreement (SLA).

As in the Balanced Scorecard methodology of Kaplan and Norton [Kaplan 1996] the strategy map is of great importance to know where the improvement initiatives should be undertaken. The cause-and-effect diagram in service management may determine where a certain service level should be improved.

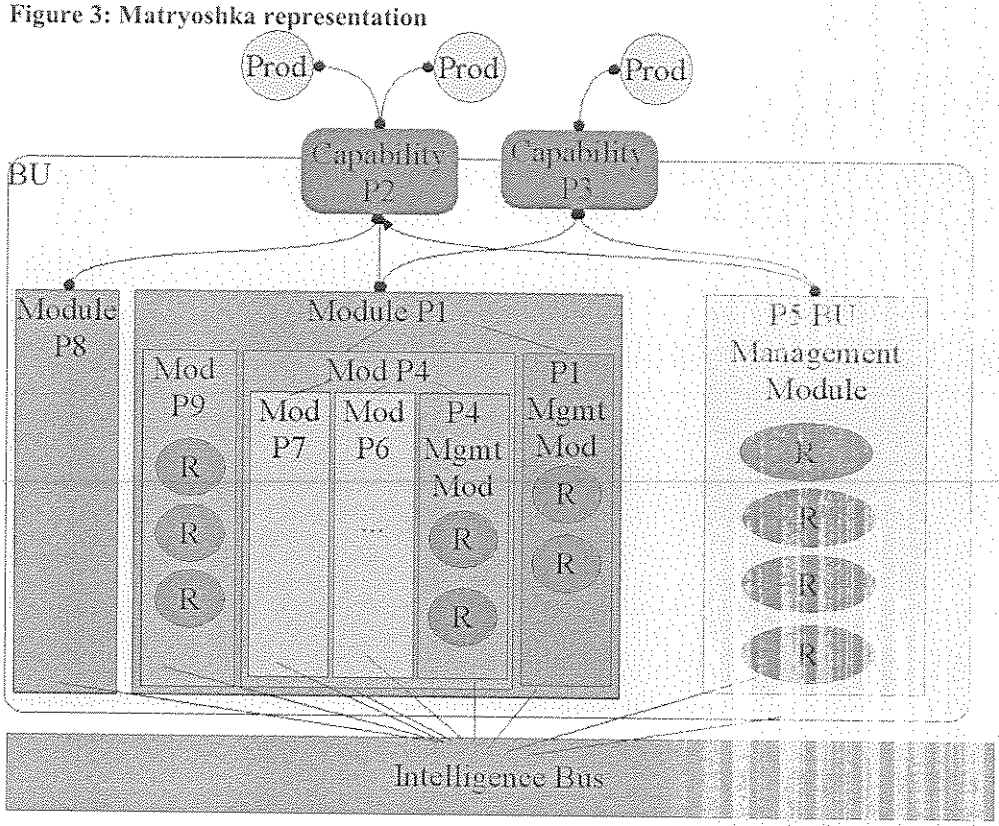
In Figure 1: CXO a capability is composed of modules, but each module can be seen as a capability itself composed of other modules. By drilling down we reach at a certain point to modules that cannot be decomposed into other modules. This is the atomic module and has only resources such as material and human resources to manage.

In Figure 3 we see that a business unit has two capabilities P2 and P3. P2 has three modules: P5 which is the management module of P2 (and P3) and is atomic, P8 from an external partner and P1. P1 itself has as capability two modules: P4, P9 and P1-M (the management module of P1). P4 has three modules: its management module, P7 and P6. So each capability can be

decomposed until it reaches atomic modules or modules serviced by partners, that is why we call this the Matryoshka representation.

Each own capability has always a management module to manage the modules and/or resources in the capability container. Each module has to be connected to the Intelligence Bus [Rabaey 2005a].

Figure 3: Matryoshka representation



Some BPM methodologies (3) propose a top-down approach, however this takes too long to reach the "most downward" processes. Since the owner of the capability container needs to know which processes (modules) are concerned for the self assessment these processes have to be described. If the top-down approach has not yet reached all or only a part of the concerning processes, the Matryoshka approach helps the manager to detect and describe the modules in his capability container.

The Chief Processes Officer (CPO) can support the description of the modules with the BPM-tool of the enterprise. Not linked processes can be put into a catalogue of business processes until the top-down approach has reached the concerned capability.

Probably all the supporting processes will be put in a division of the catalogue called Service (processes) Catalogue. However not only business processes but also ICT-programs may be part of the Service Catalogue (see below).

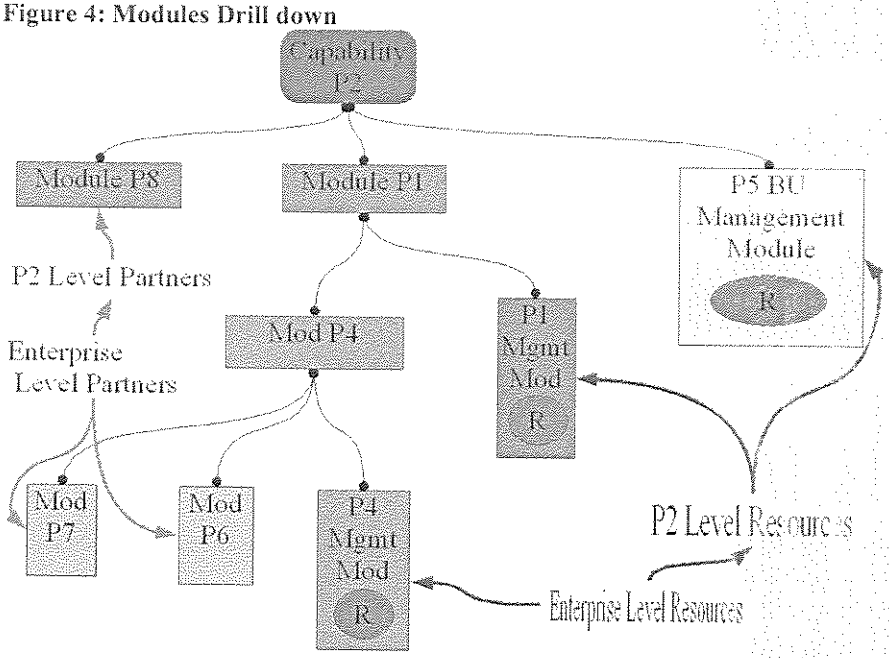
4. Service-and-Effect

As in the Balanced Scorecard methodology of Kaplan and Norton [Kaplan 1996] the strategy map is of great importance to know where the improvement initiatives should be undertaken. The cause-and-effect diagram in service management may determine where a certain service level should be improved. In stead of Cause-and-Effect, we propose the name "Service-and-

3 For example the BPM-methodology of the Belgian Ministry of Defence.

Effect" diagram.

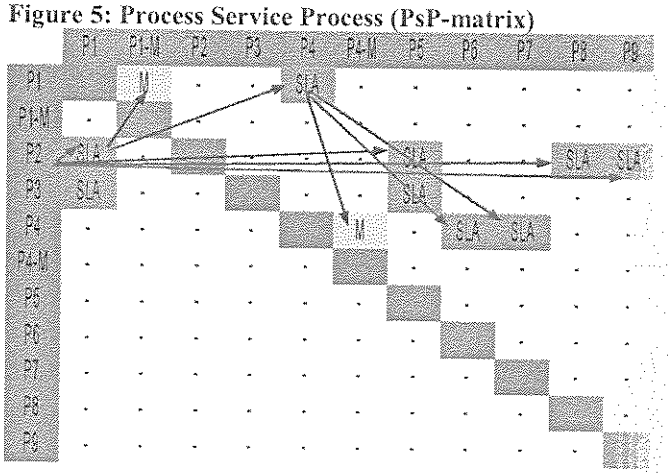
Figure 4: Modules Drill down



Besides the Matryoshka representation (see Figure 3), Figure 4 may give a graphical view of the relationships (service-and-effect), where the owners of the modules can be represented. From the point of view of the capability container, three sorts of modules can be defined:

- modules from external partners (outside the enterprise),
- modules from the enterprise but external of the capability container,
- modules owned by the capability container itself.

Figure 5: Process Service Process (PsP-matrix)



For the atomic processes (enterprise level and/or capability container level) the resources can be represented.

Regarding the management of the service level agreements (SLM:Service Level Management) we suggest the Process-Service-Process Matrix (PsP). It is derived from the evaluation method for Enterprise Application Integration presented in [Rabaey 2005c], where the relationships between the processes and their ICT-applications are described in matrices. In Figure 5 arrows are drawn to show the relations between the different modules for Capability P2.

Atomic processes cannot be further decomposed in other processes, except for the management-module. For these processes the managers of the different resources put the necessary resources in place for the functioning of the process. Instead of SLA we propose to call such an agreement

a Resource Allocation Agreement (RAA).

For each atomic process the RAA can be put in a matrix related to the respective resource domains. Resources can also be delivered via the management module of the capability.

5. Service Oriented Investment

Service Oriented Architecture (SOA) suits well to support the capability approach. As already mentioned, modules can also be ICT-programs. The main purpose of Service-Oriented Architecture is to detect discrete functions contained in enterprise applications and to organise them along with new functions (building blocks) into services that will be used by the business processes.

The Business Process Execution Language for Web Services (BPEL4WS or BPEL) is an XML-based language for the formal specification of business processes, where each step in the business process is executed by a Web Service (see [Rabaey 2003]). But the BPEL itself is also a web services, meaning that a web service can not only be a procedure or activity, but also a real business process with long cycle transactions. So, in the services catalogue not only business processes are registered, but also web services.

Rabaey et al. propose a method to evaluate Enterprise Application Integration (EAI) [Rabaey 2005c] which has been extended to SOA. It maps the interactions between processes and applications and assesses different aspects (business coverage, technical stability, costs) in a global view, which is then presented to the Interdisciplinary Forum.

At the first glance, this is typically an investment method for ICT-projects. However with the SOA fitting the capability approach, the question can be asked, if this method can be adapted to fit capability investments.

In stead of applications (rendering information services), all services are then evaluated. The service-and-effect diagram is then the map on which the Interdisciplinary Forum can decide. Due to the complexity of this map and therefore a high degree of uncertainty, classical investments are inadequate. Since uncertainty is an important factor, options could be used.

An option can be defined as "a right but not an obligation, to buy or sell something at a predefined price on or before a certain date [Miranda 2003]. Options were originally meant for financial markets (financial options) where the underlying asset is of financial nature (such as a stock or an exchange rate). Real options have tangible assets or projects as underlying asset.

The different options are sequentially put in a tree structure. In a branch, an option can only be realised if its predecessors exist. However with the capability approach, services (capabilities) can be used anywhere, they are independent from most of the other services (in the realisation).

6. Dynamic system with Intelligent Agents

As already mentioned, the environment of an organisation is changing very fast. A 'stable' future cannot be foreseen and the interacting parties of the organisation are all over the world now and are quite unpredictable. Therefore a dynamic system to determine the most optimal configuration is necessary.

We are studying a model where intelligent agents (IA) represent the items of some levels. Intelligent Agents are software entities that carry out some set of operations on behalf of a user or another program with some degree of independence or autonomy, and in so doing, employ some knowledge or representation of the user's goals or desires. They get their information out of a Knowledge Base (KnB).

The idea came from concepts of quantum medicine and quantum healing. Some forms of quantum medicine tell us amongst other things that the whole body keeps memories of events

and emotions and that organs, molecules and so on have knowledge or intelligence of what has to be done in the body (through some sort of 'communication channels'). This implies that the brains control not everything, but that intelligence and communication capabilities are spread all over the body. So the model of the enterprise is the quantum model of the body and the mind, and each part, represented by an IA, can communicate to bring and to keep the body and the mind (organisation-model) in balance and optimise its functioning ([4]).

An intelligent agent (IA) or group of IA's represents each item of every level. The IA's are however working under the guidance of a management cell (Mgmt), which defines the environment that the IA's have to use. The knowledge base is a formalised structure of information, which the IA can interpret to define its strategy.

The IA will communicate with other IA's of the same or other levels until at a certain moment the dynamic system will reach its (acceptable) optimised configuration (taking into account the set of constraints and the expected output). At this point, all costs of the resources to acquire (humans, material, infrastructure, etc.) and the costs of existing resources and the maintenance of both can be calculated for a certain period. Of course, the management will decide, which will be the final solution. The dynamic system is only a decision support system.

Derived from the first framework, we can also build a framework where the existing capabilities and its underlying components are trained and used. One of the goals of our study is to get an estimation of the operative costs.

Combined with the objectives of the operations, we can define the degrees of effectiveness, efficiency and transmittance. Transmittance is the ratio that determines the allocation of ALL resources of an organisation regarding ALL the objectives of the organisation (examined by the Interdisciplinary Forum).

7. Further research: Service options

So, with the dynamic system, one can determine the ideal configuration. The ways (roadmaps) to attain this optimal configuration can be manifold. However with the feedback gained form the intelligent agents, the amount of possible scenarios can be reduced to an acceptable number.

In this way, a tree structure as used with the real options can be determined. With the mix of different types of services, the assessment purely based on the techniques of real options cannot be performed. Certainly in the case of non-profit organisations, where management can hardly determine the inflows of projects.

Our research is about the adaptation of the real options method to a "Service Option Method". Since SLA's are a result of the Interdisciplinary Forum, the organisation is used to handle the concept of services, so that the concept of the evaluation of it is well understood in the organisation. The inflows of a project are replaced by a monetary expression of services. This requires also the use of another type of interest rate. Another research is going on to use this approach for SOA projects. However, this paper creates a research domain to investigate the assessments of all types of projects related to capabilities, not only those of ICT.

Intelligent agents are communicating with each other in so called containers. In the beginning IA could only determine its strategy regarding the environment, if this environment was explicitly defined in its set of parameters. Now IA technology has evolved, IA can now react differently according the rules of the container in which the IA has to undertake actions. Flexibility and adaptability are some of the advantages of specific containers. In the Capability Generation framework, the same system of IA can be used in different countries, each with its own set of acquisition rules, represented by their respective country IA-container.

4 A philosophical note: It is not the purpose to develop a "Quantum Enterprise" where everything is leaded and managed by software pieces. The purpose of the quantum medicine is to construct a model of the mind/body to better understand the complex set of mind and body of a human being. Our purpose is to give management a model/tool to help them better understand the complex organisation. Nothing can replace the human genius.

A second point is the formal way of representing the characteristics of the resources, modules and capabilities, so that they can be interpreted by the IA.

8. Conclusions

In this ever faster changing world, enterprises have to adapt quickly to new situations and needs. The organisation of processes and resources has to be very flexible. This paper proposes the capability approach and services oriented investment method.

Modules deliver the necessary capabilities, where one module can serve multiple capabilities. These modules are composed of resources. In the process area of capabilities generation, modules and/or resources are acquired following investment and recruiting plans (acquisition function). So we have a schema of outcomes – outputs – capabilities – modules – resources.

With the resulting Service-and-Effect diagram and the dynamic system of intelligent agents, some scenarios for improvement of capabilities (services) can be determined. The introduction of the Service Options (based on the Real Options Method) can aid the decision process for investments in capabilities.

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